Theoretical Computer Science 1996 vol.157 N2, pages 139-159

Lower bounds for one-way probabilistic communication complexity and their application to space complexity

Ablayev F.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We prove three different types of complexity lower bounds for the one-way unbounded-error and bounded-error error probabilistic communication protocols for boolean functions. The lower bounds are proved in terms of the deterministic communication complexity of functions and in terms of the notion "probabilistic communication characteristic" that we define. We present boolean functions with the different probabilistic communication characteristics which demonstrates that each of these lower bounds can be more precise than the others depending on the probabilistic communication characteristics of a function. Our lower bounds are good enough for proving that proper hierarchy for one-way probabilistic communication complexity classes depends on a measure of bounded error. As the application of lower bounds for probabilistic communication complexity, we prove two different types of complexity lower bounds for the one-way bounded-error error probabilistic space complexity. Our lower bounds are good enough for proving proper hierarchies for different one-way probabilistic space communication complexity classes inside SPACE(n) (namely for bounded error probabilistic computation, and for errors of probabilistic computation).

http://dx.doi.org/10.1016/0304-3975(95)00157-3